Remarks/Arguments

Paragraph 2. of office action dated 7/16/2010 Claims 1-3 and 13 are rejected under 35 U.S.C. 112 First Paragraph "Claims fail to comply with written description requirements". ----------"The claims recite language not found in the specification as originally filed. Specifically, the terms "Unpressurized overflow/recovery reservoir", "below the water-line"

> Paragraph [0018] of the original application
> [0018] **The invention also consists of a pressure relief and fluid overflow recovery system (FIG. 2). and includes a pressurized fluid reservoir (3), a pressure cap to regulate the pressure in the system, and allow the overflow to return on system cool down at night (2), which is connected to a fluid overflow and recovery reservoir (4).** The pressure of the fluid in the solar collector heat transfer loop is regulated by the pressure cap, which uses a spring to push against the fluid pressure over a fixed area. During normal daily operation when the sun is out, the heat transfer fluid expands as it heats from 75 degrees Fahrenheit to over 230 degrees Fahrenheit and when the pressure reaches the set pressure, **i.e. 16 PSI, fluid overflows to the fluid overflow reservoir (21), which is vented to the atmosphere by a cap (30)**. At night, when the fluid in the ***solar heat transfer system*** cools and contracts, fluid is drawn back into the heat transfer system to keep if full of fluid and keep air out. Air in the system increases the corrosion of the fluid loop. This simple system allows the approximately 50% water/50% antifreeze mixture in the solar heat transfer loop to heat up to over 212 degrees Fahrenheit, without boiling until it reaches almost 265 degrees Fahrenheit, at 16 PSI confinement pressure. This high temperature allows for heat to be transferred more efficiently into the hot water tank, using lower flow rates and an internal (or external) hot water tank heat exchanger.

The specific term *"below its water-line"* is not in the original disclosure, but in paragraph [0018] lines 1-5 you see "**and allow the overflow to return on system cool down at night (2), which is connected to a fluid overflow and recovery reservoir (4)"**. The only way to allow liquid out of a reservoir which is vented to the atmosphere is to draw it out below the water-line. If you want water out of a half full glass, children know that you must put the end of the straw in the glass below the water line. I have amended the claims to reflect "overflow fluid to return".

By definition *"unpressurized"* means it is connected by a passage to the atmosphere. Paragraph 0018 of the original application lines 9 and 10 reads "**i.e. 16 PSI, fluid overflows to the fluid overflow reservoir (21), which is vented to the atmosphere by a cap (30)"**. I have amended the claims to reflect "vented to the atmosphere"

Paragraph 4. of the office action dated 7/16/2010 rejected Claims 1 as being anticipated by Moore (3,661,202).

Figure 16 and 18 show ejector pumps and one way pressure relief valves that vent vapor to a low pressure reheat space, where it can pick up more heat, but this vapor is not allowed to leave the closed container as you can see by carefully reviewing the figures. Even though the container has a provision for variable volume (Figure 2), there is no claim or description of an unpressurized fluid reservoir open to atmosphere.

Moore's Claim 1, Lines 34-37, "a partly condensed fluid, a portion of said fluid being liquid and another portion being vapor, said liquid". The pressure in Moore's loop system is governed by the temperatures in each part of the system; he regulates the pressure difference across the pressure relief valve by heat flows, temperature and pressure.

In my system the fluid loop is full of condensed fluid; pressure is generated by the fluid having a higher volumetric thermal expansion than the container that holds it, typically copper pipes and tubing. There is no vapor of the same liquid in my fluid loop as long as the fluid is below the boiling point.

If the fluid reaches the boiling point and gas bubbles appear in the liquid, the volume created by the gas bubble must be formed by letting liquid out of the system via the pressure relief valve into the reservoir connected to the atmosphere. When the gas bubbles collapse, liquid must be drawn back into the system from the reservoir through the vacuum recovery valve to fill this void space.

I claim an unpressurized reservoir, which is open to the atmosphere.
Moore does not claim a reservoir which is open to the atmosphere.

Moore's liquid is not constrained by the container walls as long as non-condensed vapor is present. I agree with the examiner that "The fluid thermal expansion and contraction is anticipated by Moore", since he has both liquid and vapor of the same liquid in his system, with a large vapor expansion chamber and container volume increase (Figure 2) to keep pressures from rising too much. The thermal expansion of the fluid merely decreases the volume of the gas and raises its pressure slightly and increases the container volume slightly.

In Moore's system there is only condensed liquid and vapor of this liquid in the system, and thus the ideal gas law must hold. According to the gas laws PV=nRT. P= pressure of gas, V=volume of chamber and nR are gas constants and T = Temperature. Hence, if volume in the chamber is not constant and temperature increases, so must the pressure and volume. Moore shows a bladder expansion system in Figure 2 which allows the volume in the system to be increased to keep pressure rises smaller, but he does not claim any fluid reservoir vented to the atmosphere.

Paragraph 5. of the office action dated 7/16/2010 "Claims 2, 3, and 13 as being anticipated by Hardy (4,360,003)".

Hardy's Claim I, Lines 7-14 "vacuum breaker means coupled to said inlet for said tubing preventing siphoning of tank water into the domestic water system, float valve controlled outlet means coupled to said tubing within the water tank to fill the tank to a predetermined level and relief valve means coupled to said tubing providing relief in the event of excessive water temperature and pressure in said tubing."

Hardy claims a single city pressurized domestic hot water delivery system which is comprised of a pressurized water source (city water in his case), a coil bathed in water in a reservoir heated by a wood fire, a pressure relief valve, and a vacuum breaker valve and faucets in the house. The water makes a one-way trip from the city mains to the faucets. I have pointed out previously that a vacuum breaker valve is not a vacuum recovery valve. A vacuum breaker valve must have pressurized fluid (water in this case) on one side and unpressurized air on the other. A vacuum recovery valve has pressurized fluid (Glycol water in my patent application) on one side and unpressurized fluid on the other. They are not the same valve and do not function the same way, even though they may have similar sounding names. **Hardy's vacuum breaker valve must go to unpressurized air, not liquid. Hardy's vacuum breaker valve prevents water from being back siphoned into the city pressurized water system. It only operates when pressure in the city lines is lost, and pressure in the domestic water system goes below atmospheric pressure.**

Hardy does not anticipate the use of fluid circulation system that is only pressurized by the difference in thermal expansion between the fluid and container (tubing) that surrounds the fluid. In my invention the rising temperature and expansion difference causes a pressure, which opens a pressure relief valve. In a typical solar system 2 to 6 fluid ounces of fluid must be let out of the system. This fluid is stored in a reservoir which is vented to the atmosphere. When the system cools off the fluid is drawn back into the fluid circulation loop.

Hardy claims a hot water system that requires "an inlet coupled to a water supply". I claim no inlet to a water supply. Thermal expansion of the domestic hot water in Hardy's system is accommodated by a small amount of water moving back into the water main to which it is connected. My circulation system is filled with liquid; after filling, fluid can only leave through the pressure relief valve and re-enter through the overflow vacuum recovery valve.

Hardy's Claim I, Lines 7-14 "vacuum breaker means coupled to said inlet for said tubing preventing siphoning of tank water into the domestic water system, float valve controlled outlet means coupled to said tubing within the water tank to fill the tank to a

predetermined level and relief valve means coupled to said tubing providing relief in the event of excessive water temperature and pressure in said tubing."

Hardy claims a reservoir open to the atmosphere, the purpose of which is to collect heat from the fire box and convey it by pump to the home heating system. This reservoir level is maintained by a Float valve which is connected to the city water main and senses the level of the water surface in the reservoir. This valve opens to let more water into the reservoir, if the level falls. There is one of these valves in every modern toilet. The float valves are known to get stuck in the open position, and put too much water into the reservoir. Hence an overflow is provided to keep the water level in the reservoir from getting too high. This overflow is placed above the normal water level in the reservoir.

Hardy's only contact between his reservoir and domestic water system is that the coil is immersed in the reservoir so heat can go from the reservoir to the domestic hot water in the coil. His float valve and overflow are not connected, so fluid can move from the reservoir to or from the domestic water system. The float valve and domestic hot water system are both pressurized by the city main water supply. Both the domestic water system and float valve are designed to convey water out of the city main and not ever flow back into it. The float valve discharges water above the surface of the reservoir, so it is pressurized by city water and discharges into an air-filled chamber. The domestic hot water system discharges water from the main, heated by the coil into sinks, tubs and other faucets for hot water.

Hardy does not claim my invention.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully Submitted,

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